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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/016,812 | 11/30/2001 | Bin Zhao | 12569-18/NEC | 6922 |

7590

10/30/2003

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EXAMINER

CURTIS, CRAIG

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 10/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/016,812

Applicant(s)

ZHAO, BIN

Examiner

Craig H. Curtis

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Specification Objections

1. The disclosure is objected to because of the following informalities: The Applicant has failed to identify explicitly which particular elements of the instant invention are to be taken as being spatial birefringent elements. It is understood that by "spatial" birefringent, the Applicant is merely making explicit an inherent property exhibited by birefringent elements in those instances in which two orthogonally polarized light beams traverse such elements: namely, that the optical path length (defined as the product of the physical path length (l or d , say) light takes in traversing such elements & the index of refraction (n_o or n_e) associated with the polarization state of a particular light beam) will necessarily depend upon the polarization state (ordinary or extraordinary) of light traversing said "spatial" birefringent element. This, however, does not change the fact that at present the Applicant has not clearly identified which element or elements of the instant invention are to be taken as being spatial birefringent elements. Are beam displacing elements 10, 11, and 18 (all in Fig. 1) to be so considered, or are waveplates such as 21a, 22a, etc., to be accorded such distinction? Appropriate correction is required.

Claim Objections

2. Claim objected to because of the following informalities: Applicant has not explicitly set out which variable is to be associated with said recited "phase delays." It is respectfully suggested that Applicant unambiguously so associate the variable Γ with said phase delay(s). **Appropriate correction is required.**

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Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More specifically, proper antecedent support has not been provided for the following limitation: "...*the* interleaved channels...." (Emphasis added.)

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371 © of this title before the invention thereof by the applicant for patent.

4. Claims 1, 3, 4, 6-8, 10, 12-14, 16-18, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Chang et al. (6,335,830).

With regard to claim 1, Chang et al. disclose (with reference to Fig. 4a) the invention as claimed--An interleaver comprising:

a birefringent element assembly (the system depicted in Fig. 4a) comprising at least one spatial birefringent element (e.g., 400, 492, 490), the birefringent element assembly providing two output components. See, e.g., output components from spatial birefringent element 400;

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a reflector (450 and/or 452 and/or 472) configured to direct said two components from the birefringent element assembly back through the birefringent element assembly. See Fig. 4a.; esp. outputs 493 and 495.

With regard to claim 3, Chang et al. also teach wherein said reflector comprises a prism. See, e.g., 450.

With regard to claim 4, Chang et al. also teach wherein said reflector comprises a mirror. See 472.

With regard to claim 6, Chang et al. also teach wherein said reflector comprises a mirror and a quarter-wave plate (viz., quarter wave mirror 472).

With regard to claim 7, Chang et al. also teach wherein said birefringent element assembly comprises a plurality of spatial birefringent elements. See elements 492, 400, and 490.

With regard to claim 8, Chang et al. is taken to meet the recited limitations wherein said birefringent element assembly comprises a first birefringent element having an equivalent angular orientation of ϕ_1 (viz., 402) a second birefringent element having an equivalent angular orientation of ϕ_2 (viz., 410), and a third birefringent element having an equivalent angular orientation of ϕ_3 (viz., 430) (it being noted that as presently recited, equivalent angular orientations ϕ_1 , ϕ_2 , and ϕ_3 can be either identical to or distinct from one another); wherein an order of the first birefringent element, second birefringent element, and third birefringent element is (selected from the group consisting of):

first birefringent element, second birefringent element, and third birefringent element.

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With regard to claim 10, Chang et al. teach wherein said birefringent element assembly comprises two birefringent elements (e.g., elements 494, 496).

With regard to claim 12, Chang et al. teach wherein the birefringent element assembly and the reflector are configured so as to facilitate interleaving of a plurality of input light beams simultaneously. See plurality (read: two or more) of beams propagating through said birefringent element assembly in Fig. 4a.

With regard to claim 13, Chang et al. teach wherein each spatial birefringent element (viz., elements 400, 490, and 492) defines two light paths (see Fig. 4a), each light path having a different optical path length (inherent) and wherein a difference in optical path length between said two paths is provided by a material having an index of refraction greater than one (inherent; it is respectfully suggested, incidentally, that the recitation "one" be changed to "unity") which [read: that] is disposed within at least a portion of one of the first and second paths (inherent). See Fig. 4a.

With regard to claim 14, the nature of said spatial birefringent elements taught by Chang et al. is such that (as set forth above) each spatial birefringent element defines two light paths and wherein an index of refraction is different for at least a portion of at least one of the two light paths so as to cause said two light paths to have different optical path lengths (inherent).

With regard to claim 16, Chang et al. disclose the invention as claimed, said "...a polarization rotator for controlling an equivalent angle of said birefringent element assembly." limitation being met by Chang et al. in the same manner as that taught by the instant invention. (That is, said equivalent angle

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has been interpreted broadly as reading on, inter alia, the angular disposition of said birefringent element assembly as a whole.)

With regard to claim 17, said polarization rotator of Chang et al. (e.g., element 402) is a half-wave plate. See col. 5, l. 38.

With regard to claim 18, the structural element teachings of Chang et al., set forth hereinbefore, inherently meet the method teachings recited in this claim.

With regard to claim 21, Chang et al. disclose, as set forth hereinbefore, the claimed subject matter. See Fig. 4a.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 5, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (6,335,830) in view of Applicant's Admitted Prior Art.

With regard to claims 2 and 19, Chang et al. disclose the invention as set forth above **EXCEPT FOR** an explicit teaching wherein, with respect to claim 2, said interleaver as recited in claim 1 further comprises a polarization rotator configured to align the two components prior to the two components being transmitted back through the birefringent element assembly such that approximately zero dispersion

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is obtained in an output of the interleaver; and with respect to claim 19, dispersion introduced when light is transmitted in a first direction is substantially cancelled when light is transmitted in said second direction.

Applicant's Admitted Prior Art (see specification: ¶[0012], pp. 4-5), however, expressly acknowledges that "...contemporary interleavers have dispersion versus wavelength curves which have zero dispersion value at a particular wavelength, such as at the nominal channel center wavelength..." an admission that, absent further limiting language in these claims, would have made it obvious to one having ordinary skill in the art at the time the invention was made to have anticipated either that the interleaver of Chang et al. would function such that approximately zero dispersion would be obtained in an output of said interleaver or that changes to same to effect such performance would be called for, for at least the purpose of mitigating dispersion in the output of said interleaver.

With regard to claim 5, the combination teaches wherein said polarization rotator comprises a half-wave plate. See Chang et al.'s element 402.

6. Claims 9, 11, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (6,335,830).

With regard to claims 9 & 11, Chang et al. disclose the invention as set forth above, including wherein said first birefringent element has an equivalent angular orientation of 45° (col. 5, ll. 38-41) and having a phase delay of Γ (inherent) **EXCEPT FOR** explicit teachings of the following:

wherein said second birefringent element has an equivalent angular orientation of -21° and having a phase delay of 2Γ ; and

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said third birefringent element has an equivalent angular orientation of 7° and having a phase delay of 2Γ .

It is notoriously old and well-known in the optical filter art, however, to assemble optical systems (Solc filter systems, for example) in which first, second, and third birefringent elements respectively have the above-recited equivalent orientations. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of Chang et al. such that said second and third birefringent elements be disposed having the above-recited equivalent orientations, for at least the purpose of allowing a passband of said interleaver to be flattened to a selectable degree, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

With regard to claim 20, Chang et al. meet the claimed limitations as same are presently recited. Please see above.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (6,335,830) in view of Lahat et al. (6,417,944).

Chang et al. disclose the invention as set forth above **EXCEPT FOR** an explicit teaching wherein said interleaved channels have spacing [read: spacings] which is [read: are] tunable.

Lahat et al., however, explicitly disclose wherein interleaved channels have spacings which are tunable. See col. 8, ll. 9-15. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified, if necessary, the interleaver of Chang et al. such that its

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interleaved channels have spacing that were tunable, as expressly taught by Lahat et al., for at least the purpose of optimizing the performance of said interleaver vis-à-vis adequate channel separation, &c.

Double Patenting

8. Claims 1-21 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 24-49 of copending Application No. 09/891,795. Although the conflicting claims are not identical, they are not patentably distinct from each other because, where not outright identical, the claims are sufficiently similar so as to be reasonably subject to obviousness-type double-patenting rejection.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

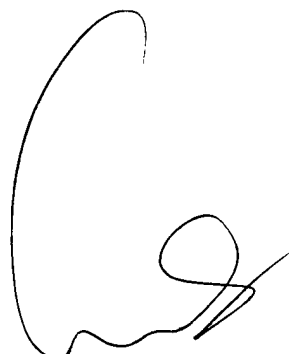
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Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig Curtis, whose telephone number is (703) 305-0776. The facsimile phone number for Art Unit 2872 is (703) 308-7721.

Any inquiry of a general nature regarding the status of this application should be directed to the Group receptionist, whose telephone number is (703) 308-0956.

Craig H. Curtis
Craig H. Curtis
Group Art Unit 2872
15 September 2003



Audrey Chang
Primary Examiner
Technology Center 2800